



COMPANY DESCRIPTION

Particle Technology Labs, Ltd. is a premier service laboratory, dedicated to providing quality particle size and characterization. It was founded in 1992 by Richard F. Karuhn. Our client list includes many of the top pharmaceutical, environmental, food, health and beauty companies worldwide. Utilizing many different technologies, PTL has the capacity to measure particle size, concentration, and shape, as well as surface area, porosimetry, and other physical measurements.

Our Registrations include:

- FDA Registered
- DEA Licensed
- ATF Permit
- cGMP Compliant



RICHARD F. KARUHN

BIOGRAPHY

Richard F. Karuhn received his Bachelor of Science degree in Chemistry from De Paul University in 1971, at which time he was an Associate Chemist for Illinois Institute of Technology Research Institute (IITRI). During a six-year period at IITRI, he was trained in *fine particle technology* from such notables as Drs. Brian Kaye and Reg Davies.

Prior to joining IITRI, Mr. Karuhn was engaged for many years in synthetic and analytical organic chemistry for the Velsicol Chemical Corporation. Following his tenure with IITRI, he held the position of Laboratory Director for Particle Data Laboratories for a 15 year period. Mr. Karuhn is currently the President and Laboratory Director of Particle Technology Labs, Ltd (PTL). PTL is a contract laboratory, specializing in particle sizing and characterization services, located in Downers Grove, Illinois.

Mr. Karuhn holds 8 patents, has published 35 times, provides expert witness services and presents lectures regarding the subject of *fine particle technology*. He has also co-authored a book on the subject with Dr. Keith Beddow of Iowa State University. His professional affiliations are listed below.

- Past Chairman of the ASTM E29.02 Committee on Subsieve Testing.
- Former member to the ASTM E-29 Executive Subcommittee on Subsieve Testing.
- Former member of ASTM Committee FO4 on Implant and Surgical Materials and Devices.
- American Chemical Society short-course instructor for 19 years on *fine particle technology*.
- Past member of the American Industrial Hygiene Association.
- Past member to the Fine Particle Society Executive Committee.
- Invited member to the Joint Association of Army, Navy, NASA and Air Force (JANNASF) Committee on Propellant Characterization. Official capacity was liaison between JANNAF and ASTM/ISO.

EXPERIENCE

Particle Technology Labs, Ltd.
Laboratory Manager

Downers Grove, IL
June 2002 to Present

Management Responsibilities:

- Supervised analysts, part-time technicians and other staff (8 employees total).
- Responsible for maintaining deadlines for all laboratory staff.
- Conducted performance evaluations and disciplinary actions.
- Performed interviews and made recommendations on hiring new employees.
- Involved in planning and implementing the company's business plan.
- Key holder for DEA (Schedule II-IV) and ATF sample storage.

Laboratory Responsibilities:

- Approved final data from analysts before releasing to clients
- Developed test methods and approved analyst methods.
- Performed sample analysis when needed and support to analysts on difficult projects.
- Assisted the Quality Assurance Unit (QAU) with pharmaceutical audits and FDA audits.
- Applied knowledge of instrument theories to solve client's and analytical problems.
- Discussed projects and developed new projects with clients by direct correspondence.
- Approved/Developed method validation and instrument qualification protocols under a cGMP quality system.
- Performed instrument qualifications (IQ, OQ, and PQ) and performance verifications.
- Wrote/Approved a variety of Standard Operating Procedures (SOPs) for instrumentation.
- Conducted work on litigation cases and provided testimony.
- Maintained all company computer systems, trouble shooting of instrument related issues and repairs.

Particle Technology Labs, Ltd.
Fine Particle Analyst

Downers Grove, IL.
June 2000 to June 2002

- Analyzed samples and developed test methods on all laboratory instrumentation.
- Discussed data with clients.
- Represented company at tradeshow.
- Presented a talk on the topic of Electric Sensing Zone technology. One of five speakers at the Chicago 2001 Bulk and Powder Solids Show short course on Particle Size Characterization.
- Demonstrated extensive knowledge of the theory surrounding nearly all forms of particle size, surface area, and other physical testing techniques including:
 - Laser Diffraction, Electric Sensing Zone, Photon Correlation, Light Obscuration-SPOS, Time of Flight-Aerodynamic Particle Size, Sieving, Zeta Potential, Dynamic Flow and Static Pressure Surface Area Analysis, Image Analysis, Photomicroscopy, True, Bulk and Tap Densities, X-Ray Sedimentation, Refractive Index Determination.
- Used the following instrumentation on a routine basis:
 - Micromeritics Elzone, Malvern Mastersizer S and 2000, Microtrac X-100, Beckman Coulter LS13320, Microtrac UPA-150, PSS 380 ZLS, TSI Aerosizer, PSS

Accusizer 770, HIAC/ROYCO 8000A, Beckman Coulter RapidVue, Image Pro Plus v4.0 software, Polarizing Light Microscope, Quantachrome Helium Pycnometer, Micromeretics Accupyc 1330, ATM Sonic Sieve, Retch Control "g" AS200 Sieve Shaker, Alpine Air Jet Sieve, Micromeretics Tristar 3000, Quantachrom AS-1, Micromeretics FlowSorb II 2300, Malvern ZetaSizer Nano, Freeman Technology FT4 Powder Rheometer.

- Performed various other physical measurements (i.e. Total Suspended & Dissolved Solids, Bulk and Tap Densities, Angle of Repose and Loss on Ignition).
- Proficient in the following software and computer skills:
 - Microsoft Windows '95, '98, XP, 2000
 - Microsoft Office Suite '97 & 2000
 - Computer Hardware Installation
 - Familiarity with small LAN networks

EDUCATION AND TRAINING

Malvern Instruments

- Photon Correlation Spectroscopy and Zeta Potential Training September 2004

McCrone Associates

- USP <788> Particulate Matter in Injectables Training July 2004

Skill Path

- Discovering the Secrets of Microsoft Access June 2004

Malvern Instruments

- Mastersizer Diffraction Training June 2003

Padgett Thompson

- How to Deal with Unacceptable Employee Behavior March 2003
- Assertiveness Skills for Managers and Supervisors September 2002
- Basic Supervision July 2002

McCrone Research Institute

- Pharmaceutical Microscopy September 2002
- Applied Polarized Light Microscopy August 2001

Media Cybernetics

- Image Pro Plus Image Analysis Software v4.0 June 2001

Central Michigan University **Bachelor's of Science**

Mt. Pleasant, MI.
1998

- Major: Biology and Earth Science, Minor: Geography
- Gold Key National Honor Society Member